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ABSTRACT

Level of cooperation in the Prisoner's Dilemma (PD) is examined for opponents acting in their own behalf or as members of a reference group consisting of strangers or friends. This subject classification interacted with trials, representatives of friend groups manifesting a consistently high level of cooperation throughout, and representatives of stranger groups and individuals showing progressive increases from moderate to high levels of cooperation over trials. After 30 trials, subjects were given positive or negative feedback (indicating that they were doing better or worse than their respective reference groups). On subsequent trials, positive feedback yielded no strategy change for the three types of subjects. Negative feedback produced strategy changes for individuals and stranger groups, but not for friend groups. A number of personality variables presumed relevant to decision style in the PD were examined. On both orientation to the PD--intention to be cooperative or competitive and expectation of cooperation or competition from one's opponent--and actual level of cooperation and competition in the PD, significant personality effects were obtained. Of particular interest in the latter case is the evidence that the influence or personality is manifested exclusively at the level of the dyad. It is concluded that the impact of personality on the PD can most profitably be studied with a dyadic focus. (Author)

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Abstract

Level of cooperation in the Prisoner's Dilemma (PD) is examined for opponents acting in their own behalf, or as members of a reference group consisting of strangers or friends. This subject classification interacted with trials, representatives of friend groups manifesting a consistently high level of cooperation throughout, and representatives of stranger groups and individuals showing progressive increases from moderate to high levels of cooperation over trials. After 30 trials, subjects were given positive or negative feedback (indicating that they were doing better or worse than their respective reference groups). On subsequent trials, positive feedback yielded no strategy change for the 3 types of subjects. Negative feedback produced strategy changes for individuals and stranger groups, but not for friend groups. A number of personality variables presumed relevant to decision style in the PD were examined. On both orientation to the PD--intention to be cooperative or competitive and expectation of cooperation or competition from one's opponent--and actual level of cooperation and competition in the PD, significant personality effects were obtained. Of particular interest in the latter case is the evidence that the influence of personality is manifested exclusively at the level of the dyad. It is concluded that the impact of personality on the PD can most profitably be studied with a dyadic focus.

EFFECTS OF REPRESENTATIVE STATUS AND DECISION STYLE ON COOPERATION IN THE PRISONER'S DILEMMA[1]

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Most research on two-person games has focused on interpersonal conflict. Not infrequently, however, the results are generalized to situations involving groups and even nations (e.g., Snyder, 1971). Several recent studies of the Prisoner's Dilemma (PD) have explored the effects on cooperation of using groups rather than individuals as players (e.g., Pylyshyn, Agnew, & Illingworth, 1966; Wilson, Chun, & Kayatani, 1965; Wilson & Kayatani, 1968). Instead of one individual opposing another, two or more persons interacted with a like number. Whereas subjects in most PD research have generally acted in their own behalf, subjects in the foregoing studies have had to take account of the preferences of their fellow group members when selecting a course of action.

One type of situation which involves both interpersonal and intergroup conflict is negotiation. Negotiators are not only concerned about their interaction with other negotiators, they also care about how well they are representing a reference group. One of the purposes of the present study was to examine the effect of being a representative of a group on behavior in the PD. What happens if the opponents in the PD must not only be concerned about each other's behavior but also about how well they are acting as a representative of their reference group?

The problem which the PD poses to a subject is one of maximizing personal gain by competing with his opponent or maximizing mutual gain through cooperation

with his opponent. Although in the short run a subject may be better off working for himself, if both parties follow this course of action neither will do as well as if they had cooperated. A representative does not necessarily have to do better at the expense of those with whom he is interacting but he is obligated to maximize the gain for his reference group. Therefore, we hypothesized that subjects who were representatives would adopt a more cooperative strategy in the PD than subjects who were only acting in their own behalf. In effect, the representative must consider the long-range implications of his decisions.

Two aspects of being a representative were manipulated--commitment to the reference group and feedback from the reference group. The more salient the reference group is to the representative, the more impact the group's demands will probably have on his behavior. The representative who is highly committed to his reference group will be more responsive to that group's demands on him because it is important to him that the group continue to perceive him as a responsible and committed member. Moreover, as a committed member of the group his goals for the group are most likely isomorphic with the group's goals. Therefore, we hypothesized that in the PD highly committed representatives would cooperate more than less committed representatives.

Feedback--the second manipulated variable--took positive or negative form. Subjects were informed that they were performing better or worse than their reference group peers in respect to monetary earnings. In regard to the impact of positive and negative feedback from one's reference group upon strategy change, one would in general expect positive feedback to make for continued use of a pre-existent strategy and negative feedback to disrupt such a strategy in favor of some alternative. To the degree, then, that an asymptote of

cooperation (or an approximation thereof) has been reached, it should be maintained or even enhanced in the face of positive feedback and diminished in the case of negative feedback.

A 3 x 2 repeated measures design was employed to examine the effects of being a representative on behavior in the PD. Subjects acted only in their own behalf, represented a group of strangers, or represented a group of friends. The two representative conditions were used as a check on commitment to one's reference group. Subjects representing friends were assumed to be more committed than subjects representing strangers. After 30 trials subjects were given positive or negative feedback on their performance relative to the other members of their group or to participants in general. Twenty trials followed the feedback manipulation.

The second purpose of the present study was to examine the effects of "decision style" on responses in the PD. By decision style we mean a subject's way of approaching and dealing with a decision-making task. Snyder and Robinson (1961) suggest the following as elements of decision style: "(a) confidence, (b) openness to new information, (c) preference for certain levels of risk and sizes of stake, (d) capacity for postponing decision without anxiety, (e) rules for adjusting to uncertainty [p. 164]." Previous attempts to relate personality characteristics and behavior in the PD have yielded relatively little payoff. Terhune (1970) offers the following reasons for the lack of a relationship: (1) Continuous interaction in two-person games leads to the opponents exhibiting similar behavior, that is, acting like one another. For example, personality effects are more muted in multitrial as opposed to single trial games (Pilisuk & Rapaport, 1964; Pruitt, 1967; Terhune, 1968; Terhune & Firestone, 1967). (2) Situations often minimize the effects of personality, particularly situations perceived as threatening (Knapp & Podell, 1968; Terhune, 1968; Terhune & Firestone, 1967) and as highly complex (Terhune, 1968; Terhune & Firestone, 1967). Terhune (1970) concludes that

"efforts to predict the development of cooperation or conflict by focusing on the predispositions of single actors is doomed to only minor success at best. The more appropriate technique is to form theory and research on the form of system behavior resulting from the particular configuration of the dispositions of the two or more actors in interaction [p. 228]." By examining personality variables which other research has suggested are relevant to decision making and by analyzing such variables by dyads as well as by individuals, we hoped to establish some relationship between personality and responses to the PD.

Method

Subjects

Subjects were 108 undergraduate men from Princeton University who volunteered to participate in the study. They earned a minimum of $3.00 for the two hours involved in the experiment. The maximum amount earned was determined by winnings from the PD.

Procedure

Subjects spent the first hour in the experiment responding to questionnaire items assessing the decision style variables. The questionnaire was entitled the Personal Reaction Inventory and contained eight scales (described later in this section). The subjects were told they were helping in the development of a questionnaire by responding to the items and were paid $1.50 when they completed the inventory.

The last questionnaire item presented the subjects with the payoff matrix they would be using later on in the experiment (see Figure 1). After describing

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Insert Figure 1 about here

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the consequences of the various choices, the subject was asked to assume he had an opponent and to indicate what choice he would make were he to have to announce his choice before his opponent. After marking his choice the subject had to state why he chose it. In the light of his choice, the subject was requested to guess his opponent's choice and the reasons for his choosing it. A final question inquired whether subjects had any previous experience using payoff matrices of this sort, and, if so, to describe the nature of this experience.

After finishing the questionnaire, all subjects were instructed in how the PD worked. Subjects were then told: (a) they had been randomly paired with another student not in the room with them who would serve as the other party in the PD; (b) there would be a series of trials in which both members of a pair would make simultaneous decisions recording their choices on the apparatus provided; and (c) they were to keep a record of their earnings since each member of a pair would know the other's responses. The subjects in the individual condition were further instructed that their goal in the experiment was to make as much money as they could because what they won would constitute their earnings for this part of the experiment. The subjects in the stranger and friend groups were told that as representatives of their groups their goal was to earn as much money as they could for their group because they would meet together after the negotiation rounds to pool their earnings and divide them equally among the members of the group.

After these instructions subjects were taken to six individual booths where they were asked to read over the instructions for the PD once more. Furthermore, they were asked to keep the doors to the booths shut and not to communicate verbally with their opponent who was next door. Since a maximum of three pairs

of subjects could be run at one time, stranger and friend groups were necessarily composed of three members. Two groups of strangers or friends were paired for each run of these conditions so that no subjects in the same stranger or friend group would oppose one another in the PD. There were 36 subjects in each of the three conditions.

In the booth each subject had a box on which there were a red and green button and two rows of lights--one green light and one red light in each row. The subject also had a copy of the payoff matrix and a sheet on which to record his earnings and to cumulate them. At the sound of a buzzer (every 30 seconds), the subject was instructed to push either the red or green button--pushing the red button indicated a cooperative response, pushing the green button indicated a competitive response (see Figure 1). When his opponent made a decision, the choices of both were illuminated on the top of the box--the red and green lights immediately above the subject's choice buttons showing his response, the top lights indicating his opponent's responses. The subject was asked to note which cell of the payoff matrix had been selected given his response and that of his opponent and to record the amount of money he should receive on his earnings record, summing this amount with previous amounts. As the trials proceeded, the subject's responses were also independently recorded on an Esterline Angus 20 pen recorder. This equipment plus the buzzer and timer were located in a separate room from the subject booths.

After 30 trials the experimenter, on the pretext of having a few moments to inspect the subjects' earning records about halfway through the experiment, asked the subjects to answer a questionnaire. The questionnaire was concerned with a check on the commitment-to-group manipulation and with the subjects' strategy to date. Upon completing his questionnaire, a subject was given one of

four instructions depending on whether he was acting in his own or a group's behalf and which evaluation (better or worse) condition he was in. The experiment then resumed. After another 20 trials, the subjects were asked to fill out another questionnaire while the experimenter inspected their total earnings. This questionnaire was concerned with a check on the evaluation manipulation and the subjects' strategy during the last 20 trials.

In all there were 50 trials of the PD, although the subjects were led to believe there would be more. Members of the dyads operating in the PD could not see or communicate with one another during the course of the experiment. The payoff matrix (see Figure 1) is the standard PD used by Pruitt (1967) in studying the decomposed PD. Pruitt found the level of cooperation across 20 trials for this matrix remained relatively constant around 50 per cent. Such a matrix should allow for a wide range of possible change in cooperative responses as a result of the experimental manipulations. With regard to the payoffs in this particular matrix, if both members of the dyad chose to cooperate, they each received 12¢; if both members of the dyad chose to compete, they each received 6¢; if one chose to compete and the other to cooperate, the payoff was 18¢ and nothing respectively. As noted earlier, a choice of a red button on our apparatus indicated a cooperative response, a choice of a green button indicated a competitive response.

Because only the expectation of pooled earnings of members of the stranger and friend groups was necessary for the research, subjects in these two conditions were actually paid what they each had won.

Representative Status

Commitment to group. Prospective subjects who indicated that they would bring some interested friends were assigned to the friend condition. The rest

of the prospective subjects were randomly assigned to the individual and stranger conditions. Subjects in the friend groups were considered to be more committed representatives than those in the stranger groups. Friends are in many respects an ongoing group--e.g., they have loyalty, often have a high degree of cohesiveness, have mutual goals, and will be interacting with one another following the experiment. Such were not the characteristics of the stranger groups. On the questionnaire completed at the end of 30 trials, subjects in the stranger groups were asked to indicate if they had ever met the other two members of their group before the experiment. If the answer was affirmative, they were asked to note on a seven-point scale the extent of their acquaintance (from casual acquaintances to close friends). The members of the friend groups were also asked to note the extent of their acquaintance.

In order to encourage a sense of group in both the stranger and friend conditions, subjects in the same group filled out the decision style questionnaire together in the same room. Moreover, they were given the instructions for the experiment together as a group and taken to their individual booths together as a group. In addition, the members of the stranger groups were introduced to one another and allowed to chat for several minutes before filling out the decision style questionnaire.

Feedback from group. Subjects were randomly assigned to the better and worse performance feedback conditions. The six subjects in each experimental session were all in the same feedback condition. Half of the subjects (18) in the individual, stranger, and friend conditions were given the better performance feedback, half were given the worse performance feedback.

After completing 30 trials of the PD, subjects in the group (stranger and friend) better condition were told by the experimenter that they were doing better in earnings than the other members of their group. In the group (stranger and friend) worse condition the experimenter told the subjects that they were

doing worse in earnings than the other members of their group. In the individual better condition subjects were told that they were doing better in earnings than most other Princeton students had done. And in the individual worse condition the experimenter said that the subjects were doing worse in earnings than most other Princeton students had done.

To check the effect of these instructions on the subjects, they were asked to indicate on a seven-point scale (from not at all to quite a bit) if they felt they needed to improve their performance vis-à-vis that of the other members of their group (for the individual conditions vis-à-vis other Princeton students). The deception employed was explained to the subjects in a post-experimental debriefing.

Measures of Decision Style

As noted earlier, we are using the term "decision style" to refer to a subject's way of approaching and dealing with a decision-making task. In the present study, eight personality variables presumed to have implications for decision making were assessed: independence of judgment, tolerance of ambiguity, dogmatism, tendency toward conciliation, suspiciousness, risk avoidance, self-esteem, and belief in external control.

A 22-item true-false attitude questionnaire developed by Asch and Barron (see Barron, 1953) was used to measure independence of judgment. Subjects high in independence of judgment are viewed as individuals capable of going their own way "with assertive but firm confidence in their own judgment [Barron, 1953, p. 169]." Budner's (1962) 16-item true-false tolerance of ambiguity scale was used to assess the subjects' ability to deal with uncertainty and liking of

situations involving uncertainty. Dogmatism was measured by a 20-item reduced version of the Rokeach (1960) Dogmatism Scale. Long and Ziller (1965) have found a negative relationship between dogmatism and use of information in a decision-making task. The dogmatic subjects limited their intake of new information, maintaining a "closed" conceptual system. Given the similar format of these three scales (the Dogmatism Scale can be cast in a true-false format), the items were mixed together in presentation to the subjects.

The conciliation, suspiciousness, and risk avoidance scales from the Personality/Attitude Schedule developed by Shure and Meeker (1965) to assess the role of personality differences in bargaining situations were used to measure those variables. In responding to the items assessing suspiciousness and the tendency toward conciliation, subjects used seven-point scales ranging from agree very much to disagree very much. The items in these two scales were mixed together in the questionnaire. In responding to the risk avoidance items subjects were asked to answer yes, no, or cannot decide. These items were in the form of questions. Shure and Meeker (1965) described persons who tend to be conciliatory as unmotivated by revenge and unlikely to use threats or more belligerent tactics in interpersonal situations. These individuals are more likely to try diplomatic and other responsive behaviors. People high in risk avoidance tend to be unwilling to take risks or expose themselves to danger whether physical or material. Individuals high in suspiciousness are described as highly distrustful, selfish, excitable, and likely to project hostility.

Self-esteem was measured by items from the Janis and Field (1959) personality questionnaire assessing feelings of inadequacy in social contexts. The items were in the form of questions and answered by checking yes, no, or cannot decide. The items for the self-esteem and risk avoidance scales were mixed together in presentation to the subjects.

The I-E Scale (see Rotter, 1966) was used to measure the subjects' generalized belief about whether success is dependent on their own behavior (internal control) or controlled by factors external to them (external control). In responding to this 23-item forced choice scale subjects are asked to choose between two alternative statements, one indicating belief in external control, the other a belief in internal control. The score is the total number of external control choices. The I-E Scale appeared by itself in the questionnaire.

PD Behavior

Orientation to PD. As noted earlier the last item in the questionnaire asked the subjects to indicate their response and that of a fictional opponent to the payoff matrix subsequently used in the experiment. The subjects' responses were considered as indicating a cooperative orientation to the PD if they chose a red response and a competitive orientation if they chose a green response. Moreover, subjects were considered as expecting an opponent to be cooperative if they indicated the opponent would choose a red response and as expecting an opponent to be competitive if they indicated the opponent would choose a green response. These two types of items were combined into a fourfold classification to indicate the subject's general orientation to the PD. That is, subjects were classified as cooperative and expecting their opponent to be cooperative, as competitive and expecting their opponent to be competitive, as cooperative but expecting their opponent to be competitive, and as competitive but expecting their opponent to be cooperative.

Perceived strategy. After trials 30 and 50, subjects were asked to indicate if they were using a strategy and, if so, to describe the strategy. The items were open-ended. Subjects were classified as either maximizing or not maximizing mutual gain. A subject was considered to be maximizing mutual gain if (a) he

said he was trying to get as much money as possible for both himself and his opponent, (b) he was interested in achieving mutual cooperation, (c) he hoped by choosing a cooperative response he could communicate to his opponent the value of mutual cooperation, or (d) he indicated he was choosing a competitive response in order to alert his opponent to the dangers inherent in being competitive and the value of cooperation. A subject was considered as not maximizing mutual gain if (a) he said he had no strategy, (b) merely indicated he chose a cooperative response all the time with no rationale, or (c) described a strategy which did not maximize mutual gain or emphasize mutual cooperation (e.g., maximized own gain or the differences between own and other's gain).

Proportion of cooperative responses. From the experimenter's records the percentage of red or cooperative responses was determined for each subject for each block of 10 trials.

Money earned. From the experimenter's record the amount of money each subject had earned after the first 30 and the last 20 trials was calculated.

Change in strategy. The number of red or cooperative responses a subject made in trials 21 through 30 was subtracted from the number of red or cooperative responses he made in trials 31 through 40 to indicate a change in strategy. The direction of the change was ignored. Whereas the perceived strategy variable mentioned above involved the subjects' perceptions of what they were doing, change in strategy focuses on the subjects' actual behavior.

Results

Effects of Being a Representative

Manipulation checks. Only 3 of the 36 subjects in the stranger groups (8%) indicated any acquaintance with the other members of their groups before the

experiment and this was casual in nature. Members of the friend groups, on the other hand, indicated that they were close friends.

With regard to feedback from the reference group, an analysis of variance of the questionnaire item concerned with felt need to improve performance vis-à-vis the rest of the group or other Princeton students showed a significant difference (F=6.58, df=1/106, p=.01) between subjects given positive and negative feedback. Subjects receiving negative feedback felt more of a need to improve their performance (M=2.46 as compared with M=1.63 for subjects receiving positive feedback).

None of the subjects indicated previous experience with payoff matrices like the present one.

Representative status. An analysis of variance examining percentage of cooperation for the first three blocks of 10 trials by type of subject showed a significant interaction between type of subject and trials (F=2.45, df=4/210, p <.05). The first three columns of Table 1 present the mean percentage of

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Insert Table 1 about here
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cooperation among the experimental groups by trials. Whereas individuals and representatives of stranger groups became more cooperative over these 30 trials, representatives of friend groups started at a high level of cooperation and remained so throughout the trials. The individuals and representatives of stranger groups had fairly parallel behavior across trials, the representatives of stranger groups being only slightly more cooperative. The type-of-subject main effect was not significant.

The other columns in Table 1 indicate the mean behavior of the different types of subjects for the first 30 trials for money earned and perceived strategy. No significant differences were found for either variable.

Feedback. An analysis of variance examining percentage of cooperation in the last two blocks of 10 trials by type of subject and type of feedback yielded only a significant feedback main effect (F=5.37, df=1/102, p<.05). Those subjects given negative feedback cooperated less (M=.68) than those given positive feedback (M=.83). The figures by type of subject and type of feedback appear in the first two columns of Table 2.

Insert Table 2 about here

When, however, the differences between the cooperative responses on trials 21-30 and trials 31-40 (the change in strategy variable) were analyzed, the type-of-subject by type-of-feedback interaction was significant (F=3.12, df=2/102, p=.05). As seen in column three of Table 2 there was little change in strategy and little difference in the changes in strategy among the types of subjects in the better feedback condition. On the other hand, when the feedback was negative the individuals and representatives of stranger groups showed marked changes in strategy while the representatives of friend groups showed hardly any change at all. The representatives of friend groups given negative feedback exhibited even less change in strategy than any of the subjects given positive feedback. They appear to have clung tenaciously to their previous strategy.

Table 2 also contains the data by type of subject and type of feedback for two other outcome variables--money earned and perceived strategy. There is a significant main effect for type of feedback for money earned ($F=4.59$, $df=1/102$, $p<.05$). Subjects given negative feedback earned less money during the last 20 trials ($M=\$2.03$) than subjects given positive feedback ($M=\$2.20$). With regard to perceived strategy, both the effect of type of feedback and the interaction of type of subject and type of feedback were significant ($\chi^2=6.64$, $df=1$, $p<.05$ and $\chi^2=12.91$, $df=5$, $p<.05$ respectively). Some 74% of the subjects receiving positive feedback indicated they used a strategy maximizing mutual gain whereas 50% of the subjects receiving negative feedback said they employed this strategy. As noted in column 5 of Table 2, individuals and representatives of friend groups given positive feedback indicated that they tried to maximize mutual gain while equivalent subjects receiving negative feedback tended not to employ this strategy. Representatives of stranger groups, regardless of feedback, said they tried to maximize mutual gain.

Effects of Decision Style

The decision style analysis had several foci. Of interest were the relationships between decision style and orientation to the PD (or behavior on the first trial presented to the subjects) and the relationships between decision style and percentage of cooperation in the PD both by individual subject and by dyad.

Table 3 presents data relevant to the relationships between decision style

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Insert Table 3 about here
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and orientation to the PD. As none of the subjects indicated a cooperative response on their part while expecting a competitive response on the part of an opponent,

only three orientations appear in Table 3. In fact the predominant expectation on the part of the subjects was one of competition--both on their part and on the part of an opponent. Some 45% of the subjects made these responses. For two of the variables, independence of judgment and self-esteem, the results of an unweighted-means analysis of variance were significant. For one other variable--tendency toward conciliation--the results approached significance ($p < .10$).

The more independence of judgment the subject manifested, the more likely he was to be competitive in his choices in the PD while expecting a cooperative opponent. The less the independence of judgment manifested, the more the subject viewed his response and that of his opponent as similar. For self-esteem, the higher the score the more likely the subject was to be competitive and expect competition from his opponent. The lower the self-esteem, the more likely the subject was to cooperate and expect an opponent to cooperate. As might be expected, subjects higher in the tendency to conciliate perceived themselves and their opponents as cooperative. Interestingly, however, those subjects lowest in tendency to conciliate did not perceive themselves and their opponents as competitive but themselves as competitive and their opponents as cooperative.

In sum, subjects who perceived themselves and their opponents as cooperative were likely to be moderate in independence of judgment, to be conciliative, and to be relatively low in self-esteem. Subjects who viewed themselves as competitive and their opponents as cooperative were likely to be high in independence of judgment, less conciliatory, and moderate in self-esteem. Those subjects expecting to be competitive themselves and anticipating competition from their opponents were low on independence of judgment, moderately conciliatory, and high in self-esteem.

In order to explore the relationship between decision style and degree of cooperation in the PD, scores on the eight decision style variables were divided at the median and subjects were classified as high or low on each variable according

to whether their score was above or below the median on that variable. Eight 2 x 3 analyses of variance were performed using position on decision style and the first three blocks of 10 trials as the independent variables and percentage of cooperation as the dependent variable. No significant main effects or interactions were found for any of the decision style variables. Individual decision style appears to have little effect on cooperation in the PD.

When, however, the decision style analysis focused on the opponents as a unit, i.e., the dyad, the results were markedly different. The dyads were classified on each of the eight decision style variables according to whether both members were homogeneously low on the trait, homogeneously high on the trait, or heterogeneous on the trait. High and low designations were arrived at by dividing the scores for each characteristic at the median.

Eight 3 x 3 analyses of variance using unweighted means were performed with this classification of the dyads and the first three blocks of 10 trials as independent variables and percentage of cooperation in the PD as the dependent variable. Although only one of the decision style variables, suspiciousness, yielded a significant type of dyadic main effect ($F=3.19$, $df=2/105$, $p<.05$), five of these variables showed significant type of dyad by trial interactions. These were independence of judgment, dogmatism, conciliation, suspiciousness, and risk avoidance. Table 4 presents the mean percentage of cooperation among the types

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Insert Table 4 about here
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of dyads by blocks of 10 trials for these five variables.

Generally decision style had more of an effect on behavior in the PD in later trials, the discrepancy in amount of cooperation between the homogeneously

high and low dyads becoming larger over time. The heterogeneous dyads tended to be similar to one or the other of the homogeneous types of dyads. The one exception to this is risk avoidance where the types of dyads became more rather than less alike across trials. Dyads with a high fear of risk taking showed a rapid increase in cooperation, going from least to most cooperative across the 30 trials, whereas low risk aversive dyads maintained a fairly consistent level of cooperation across the trials.

The most dramatic pattern is that for suspiciousness. Dyads high in suspiciousness maintained a 50% level of cooperation across trials, while dyads low in suspiciousness started with 60% cooperation and increased to 82% in cooperation across trials. Interestingly, those dyads with one opponent high and one opponent low in suspiciousness mimicked the low suspiciousness dyads rather than the high suspiciousness dyads. The behavior of the less suspicious opponent seems to have mollified the suspiciousness of the highly suspicious opponent.

Perhaps the most interesting dyads are those that are heterogeneous on a specific trait. Which member of the dyad succeeds in influencing the other? In other words, which of the homogeneous dyads does the behavior of the mixed dyad most resemble? In our results, for two of the decision style variables for which the trial by decision style interactions were significant (independence of judgment and dogmatism), the member of the dyad high in the trait influenced the behavior of the dyad. For one of these variables--suspiciousness--it will be recalled that the member of the dyad low in the trait influenced the behavior of the dyad. For two of the traits--conciliation and risk avoidance--at one time the low member of the dyad was influential, at another time the high member of the dyad was influential. In the case of these two variables 30 trials may not have been sufficient to achieve some kind of power equilibrium.

An effort was made to examine the relationship between decision style, type of subject, and behavior in the PD. Eight 2 x 3 unweighted-means analyses of variance were performed using individual subject scores (high or low) on the decision style variables and type of subject conditions as independent variables and percentage of cooperation across the first 30 trials as the dependent variable. No significant main effects or interactions were found. Given the exceedingly small number of homogeneously high and low dyads falling into the individual, stranger, and friend groups, dyadic analysis was not attempted.

Discussion

The results suggest that whether or not a person is acting in his own behalf or representing a group will affect how he behaves in the PD. Representatives, particularly the highly committed representative, as opposed to individuals, were initially more cooperative in the PD and maintained their high level of cooperation. This finding lends some support to that of Pylyshyn et al. (1966) who used groups and individuals as players in the PD. Although their groups were not as cooperative in the beginning as individuals, the groups quickly adopted a cooperative strategy and used it more consistently thereafter.

Both the present study and that by Pylyshyn et al. (1966) have implications for previous research on the PD where results with individuals have been generalized to real-life situations involving groups. Apparently, where individuals must be concerned not only about their opponents but their current or future interaction with a reference group, the latter consideration takes precedence over the former with the consequence that a strategy of mutual gain is rendered more likely. This proposition seems particularly true when representatives

interact with other representatives and groups interact with other groups. In both of these experiments, however, there was no direct communication with the opponent(s) in the PD. In the Pylyshyn et al. (1966) study a simulated opponent was used. Thus, the reference group may have been more salient than would have been the case were the opponent(s) known and communicated with.

Commitment to the reference group appears to be an important variable for representatives. Representatives of stranger and friend groups differed, particularly initially, in their degree of cooperation in the PD and they differed in their reaction to negative feedback. Commitment can take several forms--commitment to the goals of the group, commitment to the positions the group is espousing, commitment to a settlement beneficial to the group. Given the relevance that commitment may have to the way a representative maintains the balance between the demands of his reference group and the demands of other representatives, it is surprising that so little research has been concerned with this variable. Our results suggest that the representatives of the stranger groups felt less constrained by their representative status than the representatives of the friend groups, and thus were freer in their interactions with their opponents.

The level of cooperation in the present study for each type of subject was higher than that generally found (around 40%). The average percentage of cooperation across the first 50 trials was 62% for individuals, 66% for representatives of stranger groups, and 71% for representatives of friend groups. Moreover, even with the negative feedback condition, cooperation did not show a substantial decrease over the last 20 trials. The percentage of cooperation for these 20 trials was 80% for individuals, 75% for representatives of stranger

groups, and 74% for representatives of friend groups. Pruitt (1967) using the same payoff matrix found a fairly constant 50% cooperation across 20 trials. In one other study, Oskamp and Perlman (1965), levels of cooperation of the same magnitude were found as in our study. Subjects in the various conditions in Oskamp and Perlman's study cooperated about 70% of the time. In addition to the possibility that the subjects in both studies were predisposed naturally toward cooperation, two variables which Oskamp and Perlman propose as influences on cooperation are relevant to the present study as well. They found that a small amount of social interaction among the subjects in groups prior to the beginning of their experiment increased cooperation and that the use of a payoff matrix with a higher average payoff per trial produced more cooperation. The members of the groups in the present study did interact socially before the experiment began. The individuals may also have interacted while waiting for the experimenter. Moreover, the average payoff per trial for the present matrix is 9¢, substantially more than the 3¢ average payoff per trial used in the Oskamp and Perlman study which elicited 87% cooperation across 30 trials.

In attempting to explain the bases of cooperators' and competitors' beliefs about others, Kelley and Stahelski (1970) postulate the so-called "triangle hypothesis." Our data on orientation to the PD are relevant to their discussion. They suggest that when asked to indicate their response in a one-trial, no-feedback PD, subjects who say they will cooperate expect cooperation from their opponent. On the other hand, subjects who indicate a competitive choice expect both competition and cooperation from their opponents. "In a one-trial game, there is little reason to play cooperatively unless the partner is expected to play similarly, but the competitive move is reasonable either to exploit an expected cooperative move or as a defense against an expected competitive one [Kelley & Stahelski, 1970, p. 87]." Our results fit this triangle pattern--no

subjects planned to cooperate while expecting competition. Although the subjects gave evidence of different orientations to the PD, they did not differ significantly in cooperation across the first 30 trials. An analysis of variance of percentage of cooperation for the first 30 trials by type of orientation was nonsignificant. Interestingly, subjects who intended to compete but expected cooperation (the exploitative subject) cooperated most ($\underline{M}$=70%), while subjects who intended to cooperate and expected cooperation were next ($\underline{M}$=68%) followed by the subjects who intended to compete and expected competition ($\underline{M}$=62%). The exploitative subject appears to behave in an opposite direction from his orientation--more as he expected his opponent to act.

Three of the decision style variables were related to the orientations to the PD. Subjects with a cooperative orientation were highly conciliatory; subjects with a competitive orientation were high in self-esteem; subjects with an exploitative orientation were high in independence of judgment. Data from other studies extend the picture of the individuals holding these three orientations. Deutsch (1960) found that subjects with a competitive orientation were high on authoritarianism. Wrightsman (1966) observed that subjects with a cooperative orientation had more generally positive attitudes toward human nature. Terhune (1968) reported that subjects with a cooperative orientation were high in need for achievement; subjects with an exploitative orientation were high in need for power. The person, then, with a cooperative orientation is conciliatory in his response to others, generally optimistic about man, and has a need to achieve. The individual with an exploitative orientation is assertive, persists in his beliefs, and has a need to gain and exert control over others. The competitively oriented individual is self-confident and authoritarian. An intriguing question

is whether these relationships between personality characteristics and orientation generalize to situations involving cooperation and competition other than the PD.

Given these orientations to the PD, the subject begins the series of trials involved in the experiment and interacts with an opponent. And as our results and the results of others (see the Terhune [1970] review) indicate, the predispositions of the subject alone are no longer very salient. Rather, the characteristics of the dyad become important. The subjects are dependent on each other's predispositions and predilections. Unlike the Tedeschi, Lesnick, and Gahagan (1968) proposal that ideographic factors "wash out" over time as the subjects "become bound up in the logic of the conflict situation [p. 32]," our results suggest that some personality variables become more influential over time. The very fact that the subjects become bound up in the situation may give prominence to the interaction of the personality characteristics of the opponents. The focus of attention merely switches from the ideographic characteristics of the single subject in the one-trial PD to the ideographic characteristics of the pair of opponents in the multi-trial PD.

Variables which can be classified as characteristics of decision style appear relevant to understanding behavior in the PD--both the orientations of the subjects toward the PD and the outcomes of their interactions with an opponent. Armed with this set of variables and with a dyadic focus in the examination of the effects of personality in multi-trial PD experiments, the investigation of the relationship between personality and behavior in the PD may prove more fruitful.

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Footnote

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Table 1

Mean Behavior on Outcome Variables for Various Types

of Subjects Across First 30 Trials

Type of Subject	Outcome Variables					
	Percentage of Cooperation Trials			Money Earned	Perceived Strategy	
	1-10	11-20	21-30		Maximizes Mutual Gain	No Strategy or Other Type
Individuals	51	64	70	$2.91	24	12
Representatives of Stranger Groups	58	65	76	$2.99	26	10
Representatives of Friend Groups	71	69	74	$3.08	19	17

Table 2

Mean Behavior on Outcome Variables for Various Types of Subjects and Feedback Conditions Across Last 20 Trials

Type of Subject by Type of Feedback	Outcome Variables					
	Percentage of Cooperation Trials		Change in Strategy	Money Earned	Perceived Strategy	
	31-40	41-50			Maximizes Mutual Gain	No Strategy or Other Type
Individual Better	94	97	1.00	$2.34	14	4
Individual Worse	66	63	2.17	$1.98	7	11
Representative of Stranger Group Better	72	79	0.83	$2.11	14	4
Representative of Stranger Group Worse	67	81	2.33	$2.09	13	5
Representative of Friend Group Better	77	81	1.00	$2.15	12	6
Representative of Friend Group Worse	73	67	0.39	$2.04	7	11

Table 3

Mean Scores for Decision Style Variables Showing Relationship to Orientation to PD by Type of Orientation

Orientation to PD[a]	Decision Style Variables		
	Independence of Judgment	Tendency Toward Conciliation	Self-Esteem
Cooperate, Expect Opponent to Cooperate (N=26)	13.27	57.77	20.38
Compete, Expect Opponent to Cooperate (N=33)	14.12	50.58	21.09
Compete, Expect Opponent to Compete (N=48)	12.29	54.54	23.10
	F=3.70 df=2/104, p=.03	F=2.48 df=2/104, p=.09	F=3.66 df=2/104, p=.03

[a]One of the subjects failed to complete these questions so the total N here is 107.

Table 4

Mean Percentage of Cooperation Among Types of Dyads by

Blocks of 10 Trials for 5 Decision Style Variables

pe of yad	Independence of Judgment				Dogmatism				Conciliation				Suspiciousness				Risk Avoidance			
		Trials				Trials				Trials				Trials				Trials		
	N	1-10	11-20	21-30	N	1-10	11-20	21-30	N	1-10	11-20	21-30	N	1-10	11-20	21-30	N	1-10	11-20	21-30
Low	14	58	52	61	12	62	58	61	13	58	70	65	11	60	79	82	17	61	67	69
High	25	61	70	79	28	58	66	78	27	58	58	73	33	63	66	78	22	65	64	73
gh High	15	62	73	75	14	63	73	74	14	66	78	81	10	50	54	49	15	53	68	78
	F=2.43, df=4/210, p < .05				F=3.47, df=4/210, p < .01				F=3.11, df=4/210, p < .05				F=3.89, df=4/210, p < .01				F=2.78, df=4/210, p < .05			

te.--N's shown in the table represent number of dyads.

Figure Caption

Fig. 1. Payoff Matrix

Party 1